Case 2722

Rivulus marmoratus Poey, 1880 (Osteichthyes, Cyprinodontiformes): proposed conservation of the specific name

Kenneth J. Lazara
Department of Mathematics and Science, U.S. Merchant Marine Academy, Kings Point, New York 11024, U.S.A.

Michael L. Smith
American Museum of Natural History, Central Park West at 79th Street, New York, N.Y. 10024, U.S.A.

Abstract. The purpose of this application is to conserve the specific name of *Rivulus marmoratus* Poey, 1880 for a self-fertilising hermaphroditic killifish. The name is threatened by the senior subjective synonym *ocellatus* Hensel, 1868. Through misidentification the latter name has been used for a second species, which is correctly named *caudomarginatus* Seegers, 1984.

1. In 1880 Poey (p. 248) described *Rivulus marmoratus* on the basis of specimens from Cuba or the U.S.A. (he was uncertain of their origin). Rivas (1945) identified two specimens labeled *Rivulus cylindraceus* in the collection of the United States National Museum as *R. marmoratus*; using circumstantial evidence he stated that these specimens were Poey's original type specimens, and of these specimens designated as lectotype specimen USNM 37429. We do not accept Rivas's assertion that this specimen is a syntype and believe the types have been lost. This does not affect the case.

2. The species is distributed in marginal marine and semi-terrestrial habitats from southern Florida, U.S.A., through the Caribbean basin to the southern coast of Brazil. It is widely used in experimental studies because it is easily manipulated in the laboratory and because it is the only fish that is a self-fertilising hermaphrodite. This has led to the development of clones which, being genetically uniform, provide a control for genetic variation in numerous studies involving carcinogenicity, mutagenesis, teratogenesis and other areas of environmental research.

3. The species has been listed consistently as *R. marmoratus* in the American Fisheries Society's list of names (Robins et al., 1980, p. 33, and the earlier editions of 1960 and 1970) and *marmoratus* is the only name applied to the species in the experimental and genetic literature prior to Seegers, 1984 (see para. 4 below). Reports which have used the name, in a variety of disciplines, include Rivas, 1945 (species characteristics); Parenti, 1981, pp. 482–483 (systematics); Harrington & Rivas, 1958 (distribution and ecology); Koenig et al., 1982 (value as an experimental subject); Mittwoch, 1973 (genetics); Harrington, 1975 (sex determination); Massaro et al., 1975 (isozymes); Snelson, 1978 (conservation status); Davis, 1986 (use as a pollution indicator); Park & Kim, 1984 (response to diethylnitrosamine), Abel et al., 1988 (response to hydrogen sulfide); Park & Lee, 1988 (scale growth); Lindsey, 1988

(meristic variation); Ali et al., 1988 (microanatomy of photoreceptors). The name is used by conservationists monitoring endangered populations and the general public interested in the species' unique life history. It is therefore familiar to many non-systematists working with Recent fishes. A list of a further 100 references is held by the Commission Secretariat.

4. The name *Rivulus ocellatus* was proposed by Hensel in 1868 (p. 365) for a fish from Rio de Janeiro, Brazil. The holotype, cat. no. ZMB 7448, is in the Zoologisches Museum der Humboldt-Universität, Berlin (Seegers, 1984, p. 302). The species was known only from the single specimen for 116 years and has rarely been mentioned other than by misidentification (see para. 6 below), although it occurs in the following few faunal lists and lists of synonymies: Eigenmann & Eigenmann (1891, p. 64), Garman (1895, p. 137), Eigenmann (1910, p. 454), Regan (1912, p. 497), Myers (1927, p. 125), von Ihering (1931, p. 261), Fowler (1954, p. 222), and Hoedeman (1956, p. 199; 1959, pp. 49, 52; 1961, p. 65). In 1984 Seegers identified and studied an aquarium stock from Rio de Janeiro and concluded that *ocellatus* and *marmoratus* are conspecific. He adopted the prior name *ocellatus* in accord with the Principle of Priority but contrary to the general acceptance of *marmoratus* as the long-established name for the taxon.

5. A few authors (Thyagarajah & Grizzle, 1986; Grizzle & Thyagarajah, 1987; Park & Yi, 1989) have used the trinomen *R. ocellatus marmoratus*, citing Seegers (1984) as the source. Seegers (p. 304) actually stated that the trinomen could be used only if subspecies were found in the future. No one has suggested that differences exist to justify use of subspecific names.

6. In 1906 Köhler (p. 407, fig. on p. 406) reported the import of a fish that he identified as *R. ocellatus* Hensel, 1868 and which has since become known under that name. Seegers (1984, p. 302) found that this fish did not agree with the description of *ocellatus* and proposed a new specific name, *caudomarginatus*. Of the few known papers that use the name *ocellatus*, most use it as a misidentification sensu Köhler; these are Bögershausen (1910, p. 317), Regan (1912, p. 497, in part), Dreiser (1922, p. 222), von Ihering (1931, p. 261, in part), Innes (1932, p. 247), Stoye (1935, p. 107 and pl. 47), Arnold & Ahl (1936, p. 342), Rachow (undated, no. 641), Fowler (1954, p. 222, in part), Hoedeman (1956, p. 119; 1959, p. 44; 1961, p. 70), Terceira (1974, p. 115), Seegers (1980, p. 141) and Sterba (1983, p. 500). Thus, through the misidentifications cited above, the name *ocellatus* is associated with a fish other than *marmoratus*.

7. We believe that to upset 109 years of extensive usage of the name *Rivulus marmoratus* would be a disservice to users of the biological literature. Article 23(b) of the Code states that the Principle of Priority is to be used to promote stability and should not be used to overturn a long accepted name in its accustomed meaning.

8. The International Commission on Zoological Nomenclature is accordingly asked:

(1) to use its plenary powers to suppress the specific name *ocellatus* Hensel, 1868, as published in the binomen *Rivulus ocellatus*, for the purposes of the Principle of Priority but not for those of the Principle of Homonymy;

(2) to place on the Official List of Specific Names in Zoology the specific name *marmoratus* Poey, 1880, as published in the binomen *Rivulus marmoratus*;

(3) to place on the Official Index of Rejected and Invalid Specific Names in Zoology the specific name *ocellatus* Hensel, 1868, as published in the binomen *Rivulus ocellatus* and as suppressed in (1) above.

References

Abel, D.C., Koenig, C.C. & Davis, W.P. 1987. Emersion in the mangrove forest fish *Rivulus marmoratus*: a unique response to hydrogen sulfide. *Environmental Biology of Fishes*, **18**(1): 67–72.

Ali, M.A., Klyne, M.A., Park, E.H. & Lee, S.H. 1988. Pineal and retinal photoreceptors in embryonic *Rivulus marmoratus* Poey. *Anatomischer Anzeiger*, **167**(5): 359–369.

Arnold, J.P. & Ahl, E. 1936. *Fremdländische Süsswasserfische*. 592 pp. Wenzel & Sohn, Braunschweig.

Bögershausen, W. 1910. Etwas vom *Rivulus ocellatus*. *Wochenschrift für Aquarien- und Terrarienkunde*, **7**(23): 317–318.

Davis, W.P. 1986. The role of *Rivulus marmoratus* in research on aquatic pollutants. *Journal of the American Killifish Association*, **19**(1): 70–80.

Dreiser, J.E. 1922. Meine Erfahrungen bei der Zucht von *Rivulus ocellatus*, *tenuis*, und *strigatus*. *Wochenschrift für Aquarien- und Terrarienkunde*, **19**: 222–223.

Eigenmann, C.H. 1910. Catalogue of the fresh-water fishes of tropical and south temporate America. *In* Scott, W.B. (Ed.), *Reports of the Princeton University Expeditions to Patagonia, 1896–1899*, vol. 3 (Zoology), part 4, pp. 375–511. Pierpont Morgan Publication Fund, Princeton.

Eigenmann, C.H. & Eigenmann, R.S. 1891. A catalog of the fresh-water fishes of South America. *Proceedings of the United States National Museum*, **14** (842): 1–81.

Fowler, H.W. 1954. Os peixes de agua doce do Brasil. *Arquivos de Zoologia do Estado de São Paulo*, **9** (4a): 1–400.

Garmam, S. 1895. The cyprinodonts. *Memoirs of the Museum of Comparative Zoology of Harvard University*, **19**(1): 1–179.

Grizzle, J.M. & Thyagarajah, A. 1987. Skin histology of *Rivulus ocellatus marmoratus*: apparent adaptation for aerial respiration. *Copeia*, **1987**(1): 237–240.

Harrington, R.W., Jr. 1975. Sex determination and differentiation among uniparental homozygotes of the hermaphroditic fish *Rivulus marmoratus* (Cyprinodontidae: Atheriniformes). Pp. 249–262 *in* Reinboth, R. (Ed.), *Intersexuality in the Animal Kingdom*. xv, 449 pp. Springer-Verlag, Berlin, Heidelberg, New York.

Harrington, R.W., Jr. & Rivas, L.R. 1958. The discovery in Florida of the cyprinodont fish *Rivulus marmoratus*, with a redescription and ecological notes. *Copeia*, **1958**(2): 125–130.

Hensel, R. 1868. Beiträge zur Kenntnis der Wirbelthiere Südbrasiliens. *Archiv für Naturgeschichte Wiegman*, **34**(1): 323–375.

Hoedeman, J.J. 1956. Die bisher beschreibenen Formen und Arten der Gattung *Rivulus* Poey. *Aquarien Terrarien*, **3**: 199–202.

Hoedeman, J.J. 1959. Rivulid fishes of Surinam and other Guyanas, with a preliminary review of the genus *Rivulus*. *Studies on the Fauna of Surinam and other Guyanas*, **3**(7): 44–98.

Hoedeman, J.J. 1961. Studies on cyprinodontiform fishes. 8. Preliminary key to the species and subspecies of the genus *Rivulus*. *Bulletin of Aquatic Biology*, **2**(18): 65–74.

Ihering, R., von. 1931. Cyprindontes brasileiros (Peixes 'Guarús') Systematica e informações biologicas. *Archivos do Instituto Biologico de São Paulo*, **4**: 243–279.

Innes, W.T. 1932. *Goldfish varieties and tropical aquarium fishes*. Ed. 15, 317 pp. Innes & Sons, Philadelphia.

Koenig, C.C., Abel, D.C., Klingensmith, C.W. & Maddock, M.B. 1982. *Usefulness of the self-fertilizing cyrinodontid fish*, Rivulus marmoratus, *as an experimental animal in studies involving carcinogenesis, teratogenesis, and mutagenesis*. 129 pp. U.S. Environmental Protection Agency, Environmental Research Laboratory, Gulf Breeze, Florida.

Köhler, W. 1906. Neimportierte bezw. erstmalig nachgezüchtete Zahnkarpfen (Poeciliidae), 2. A. Eigebärende Zahnkarpfen (Poeciliidae oviparae). 3. Neu importierte *Rivulus*-Arten. *In* Wichand, B. & Köhler, W. (Eds.), Diesjährige Neuheiten in Wort und Bild. *Blätter für Aquarien- und Terrarien-Kunde*, **17**(41): 404–408.

Lindsey, C.C. 1988. Factors controlling meristic variation. Pp. 197–274 *in* Hoar, W.S. & Randall, D.J. (Eds.), *Fish physiology*, vol. 11 (The physiology of developing fish), part B (Viviparity and posthatching juveniles). 436 pp. Academic Press, San Diego.

Massaro, E.J., Massaro, J.C. & Harrington, R.W., Jr. 1975. Biochemical comparison of genetically-different homozygous clones (isogenic, uniparental lines) of the self-fertilizing fish *Rivulus marmoratus*. Pp. 439–453 *in* Markert, C.L. (Ed.), *Isozymes 3*. xxi, 965 pp. Academic Press, New York.

Mittwoch, U. 1975. Chromosomes and sex differentiation. Pp. 438–446 *in* Reinboth, R. (Ed.), *Intersexuality in the Animal Kingdom*. xv, 449 pp. Springer-Verlag, Berlin, Heidelberg, New York.

Myers, G.S. 1927. An analysis of the genera of neotropical killifishes allied to *Rivulus*. *Annals and Magazine of Natural History*, (9)**19**(109): 115–129.

Parenti, L.R. 1981. A phylogenetic and biogeographic analysis of cyprinodontiform fishes (Teleostei, Atherinomorpha). *Bulletin of the American Museum of Natural History*, **168**(4): 335–557.

Park, E.H. & Kim, D.S. 1984. Hepatocarcinogenicity of diethylnitrosamine to the self-fertilizing hermaphroditic fish *Rivulus marmoratus* (Teleostomi: Cyprinidontidae). *Journal of the National Cancer Institute*, **73**(4): 871–876.

Park, E.H. & Lee, S.H. 1988. Scale growth and squamation chronology for the laboratory-reared hermaphroditic fish *Rivulus marmoratus* (Cyprinodontidae). *Japanese Journal of Ichthyology*, **34**(4): 476–482.

Park, E.H. & Yi, A.K. 1989. Photoreactivation rescue and dark repair demonstrated in UV-irradiated embryos of the self-fertilizing fish *Rivulus ocellatus marmoratus* Teleostei Aplocheilidae. *Mutation Research*, **217**(1): 19–24.

Poey, F. 1880. Revisio piscium cubensium. *Anales de la Sociedad Española de Historia Natural*, **9**(2): 243–261.

Rachow, A. [undated]. *Rivulus ocellatus*. No. 641 *in* Holly, M., Meinken, H. & Rachow, A.C., (Eds.), *Die Aquarienfische in Wort und Bild*. Looseleaf pages, unnumbered. Alfred Kernan Verlag, Stuttgart.

Regan, C.T. 1912. A revision of the poeciliid fishes of the genera *Rivulus*, *Pterolebias*, and *Cynolebias*. *Annals and Magazine of Natural History*, (8)**10**(59): 494–508.

Rivas, L.R. 1945. The discovery and redescription of the types of *Rivulus marmoratus* Poey, a cyprinodont fish from Cuba. *Journal of the Washington Academy of Science*, **35**(3): 95–97.

Robins, C.R., Bailey, R.M., Bond, C.E., Brooker, J.R., Lachner, E.A., Lea, R.N. & Scott, W.B. 1980. A list of common and scientific names of fishes from the United States and Canada. Ed. 4. *American Fisheries Society Special Publication*, No. 12: 1–174.

Seegers, L. 1980. *Killifische, eierlegende Zahnkarpfen im Aquarium*. 174 pp. Verlag Eugen Ulmer, Stuttgart.

Seegers, L. 1984. Zur Revision der *Rivulus*-Arten Südost-Brasiliens mit einer Neubeschreibung von *Rivulus luelingi* n. sp. und *Rivulus caudomarginatus* n. sp. (Pisces: Cyprinodontidae: Rivulinae). *Zoologische Beiträge N.F.*, **28**(2): 271–320.

Snelson, F.F., Jr. 1978. Threatened *Rivulus*. *In* Pritchard, P.C.H. (series Ed.), *Rare and Endangered Biota of Florida*. Pp. 18–19 *in* Gilbert, C.R. (Ed.), vol. 4, Fishes. xviii, 58 pp. University Presses of Florida, Gainesville.

Sterba, G. 1983. *The Aquarium Encyclopedia*. 609 pp. The MIT Press, Cambridge, Massachusetts.

Stoye, F.H. 1935. *Tropical fishes for the home*. 2nd Ed., 284 pp., 175 pls. Carl Mertens, New York.

Terceira, A.C. 1974. *Killifish, their care and breeding*. 143 pp. Pisces Publishing Corporation, Norwalk, Connecticut.

Thyagarajah, A. & Grizzle, J.M. 1986. Nuclear glycogen and lipid in hepatocytes of a fish, *Rivulus ocellatus marmoratus*. *Canadian Journal of Zoology*, **64**(12): 2868–2870.